

What's to Gain from Grains?

An update of the scientific evidence



**Grains &
Legumes
Nutrition
Council**

Cultivating Good Health



Foreword

I have been associated with the Grains & Legumes Nutrition Council™ for many years and it is with pleasure that I introduce their latest initiative. Grain foods have been one of the staples recommended to Australians in Government dietary guidelines, with increasing emphasis on whole grain and/or high fibre grain foods at each revision of those guidelines.

It is therefore concerning to note the number of Australians limiting core grain foods in their diet as a result of lack of knowledge of their benefits and misconceptions such as their consumption is linked to weight gain. This report provides an important update on the research evidence of the health benefits of grain foods. It also examines some ways in which health professionals can assist consumers in making good quality grain food choices.

Dr David Roberts,
Grains & Legumes Nutrition Council™ Scientific Review Panel



Reasons to encourage Australians to enjoy grain foods 3-4 times a day, choosing at least half as whole grain or high fibre grain foods:

1. Consumption of 2-3 serves of whole grain and/or high fibre grain foods is associated with a 20-30% reduced risk of chronic disease
2. Cereal fibre from grain foods is linked to reduced risk of bowel cancer
3. People who eat higher intakes of whole grain or high fibre grain foods tend to gain less weight
4. Cereal fibre is linked to protection against heart disease
5. Including one meal a day of refined grain core foods (like white bread, white rice or pasta) as part of a healthy diet does not increase disease risk



Are Australians eating enough grain foods?

Recent research suggests that Australians are unsure of the benefits of grain foods in the diet and are choosing options high in saturated fat, added salt and added sugars more often.

A survey commissioned by the Grains & Legumes Nutrition Council™ to track grain food consumption in Australia (2011 Consumption Study) indicates people are eating 20% less core grain foods a day compared with data obtained in 2009. Of particular concern is that people are also choosing whole grain foods less often, with whole grain food intake declining by around 20% over the same period.¹ The results suggest that only one third of Australians' grain food intake is coming from whole grain foods which indicates that many Australians' diets are not in line with the Australian Dietary Guidelines recommendation of making grain food choices 'mostly wholegrain and/or high cereal fibre varieties'.²

Reasons for the decline in the intake of grain foods, including whole grain or high fibre grain foods may be a result of misconceptions and a lack of understanding of their benefits. One in five male respondents in the survey indicated that they do not understand the benefit of grain foods in the diet, and more than one in every three

women reported limiting grain foods to assist in weight loss. The survey also found that not only are people eating less core grain foods, they are choosing discretionary grain foods (grain foods high in saturated fat, salt and added sugars) more often. On average, one third of the total grain foods eaten by Australians each day are discretionary grain foods like cakes, biscuits, pastries and takeaway foods such as hamburgers, hot dogs and pizza. This is an increase from two years ago when the same survey found 22% of grain foods eaten were discretionary grain foods.

To help health care professionals address this lack of understanding, this research update provides an overview of the latest evidence on the benefits of grain foods in the Australian diet. It will assist in reminding people of the health benefits of core grain foods and encouraging them to enjoy grain foods 3-4 times each day, choosing at least half as whole grain or high fibre grain foods while limiting intake of the discretionary (non-core) grain foods.



Core grain foods – including breads, breakfast cereals, crispbreads, rice, pasta and noodles are primary contributors of fibre, thiamin, magnesium and iron in the Australian diet.^{3,4}

Discretionary grain foods – grain foods high in salt, fat or added sugar, including cakes, pastries, biscuits, chips, pies and sausage rolls.



Cereal Fibre & Digestive Health

We are all familiar with the advice to eat dietary fibre because ‘it helps keep you regular’. However, increasingly evidence is indicating that there is much more to the story: different types of fibre each have distinct roles and confer unique health benefits. So a combination of different fibres is key to optimal gut health.

The fibre in grain foods passes through the small intestine undigested and, on reaching the large bowel, is fermented by bacteria. Carbohydrates act as prebiotics as they are the primary substrates for gut bacteria and the fermentation selectively promotes the growth of beneficial bacteria.

The bacterial population of the bowel is critical for health. Numerous studies have established that changes in diet, particularly increases in amount and quality of carbohydrate, can affect the bacterial populations in the large bowel and so have consequences for gut health.⁵

In the colon, the resident beneficial bacteria facilitate the conversion of dietary fibre and other undigested material into short chain fatty acids (SCFA). The main SCFA are acetate, propionate and butyrate. Of these, it is believed that butyrate is of particular benefit for lowering bowel cancer risk as it promotes the death of colorectal cancer cells.⁶ It has been shown that a low carbohydrate diet reduces the production of the beneficial SCFA such as butyrate, highlighting the importance of including grain foods in the diet.⁷

According to David Topping from the CSIRO, “The paradox in Australia is that while we have one of the highest intakes of fibre in industrialised countries we still have one of the highest rates of bowel cancer. The answer lies not in advice to increase fibre intake generally, but more importantly to eat different types of fibre including foods that contain resistant starch which promotes the production of butyrate”.

Fibre type	Soluble fibre	Insoluble fibre	Resistant starch
Function	Form a thick gel as they pass through the stomach and small intestine, slowing digestion and resulting in lower blood glucose levels after eating. Soluble fibre also binds bile salts which helps to lower cholesterol levels.	Remains intact as it passes through the digestive system where it helps to promote bowel function and digestive wellbeing by shortening transit time, producing larger and softer stools and increasing defecation frequency.	Starches that resist small intestinal breakdown are fermented by bacteria in the large bowel, producing short chain fatty acids (SCFA), which helps to boost the growth of “good bacteria” promoting colonic health.
Sources	Oats, barley and foods made with these ingredients like breakfast cereals, breads and crispbreads as well as legumes (dried or canned), seed husks, some fruits and vegetables.	Most whole grains (whole wheat, brown rice, rye, barley), wheat bran, rice bran, bran based breakfast cereals, whole grain and wholemeal breads, pastas, crispbreads, noodles and couscous as well as nuts, seeds and the skin of fruit and vegetables.	Whole grains, whole grain foods including breads, pasta, noodles, rice, breakfast cereals as well as legumes, cold cooked potatoes and firm bananas.

Grain foods: a key to the puzzle of rising bowel cancer rates

Colorectal cancer is one of the most common forms of cancer in Australia, affecting one in 12 people under the age of 85 and leading to the death of almost 80 people every week. A recent systematic review and dose-response meta-analysis of 25 prospective cohort studies reported that fibre from grains and particularly whole grains is associated with reduced risk of colorectal cancer, but fibre from fruit and vegetables does not have a significant association.⁸

From an analysis of the eight cohort studies that reported on cereal fibre intake, the review found that for every 10g of cereal fibre, the risk of developing bowel cancer was reduced by 10%. In addition, people who ate 3 serves of whole grain and/or high fibre grain foods per day were 17% less likely to develop bowel cancer than those people who didn’t eat whole grain and/or high fibre grain foods.

Reference Values for Dietary Fibre ⁹	Men	Women
Adequate Intake	30g/day	25g/day
Suggested Dietary Target for reduction of chronic disease	38g/day	28g/day



Practice Tip:
Promote a diet rich in a range of fibres by encouraging people to eat a variety of high fibre foods, including whole grains and high fibre grain foods.



Grain foods & Irritable Bowel Syndrome

INTERVIEW: Dr Jane Muir discusses the treatment of Irritable Bowel Syndrome (IBS) with dietary manipulation of carbohydrates.

Jane has over 20 years experience in nutrition research, with a focus on the role of carbohydrates in the health of the gastrointestinal tract. Her current research is in the role of poorly absorbed short chain carbohydrates (called FODMAPs) on the genesis of symptoms in patients with functional gut disorders such as IBS.



Dr Jane Muir. Dietitian and Head of Research, Eastern Health Clinical School, Monash University.

1. What proportion of the Australian population do you estimate suffers from IBS?

Irritable bowel syndrome affects one in seven adults in Australia and is characterised by GI symptoms including lower abdominal pain, bloating, wind and altered bowel habit (ranging from constipation to diarrhoea). We still do not fully understand the causes of IBS but it appears that it involves disruption of the gut microflora, disturbed motility and hypersensitivity of the gut to gas produced when small unabsorbed carbohydrates are rapidly fermented by the gut bacteria.

2. Do you recommend people with IBS avoid all grain foods?

Dietary manipulation of certain dietary carbohydrates (we have called FODMAPs) is one accepted first line of therapy for these patients. FODMAPs stands for Fermentable, Oligosaccharides, Disaccharides, Monosaccharides and Polyols which are widely distributed in food. Many grain foods and cereals contain fermentable

oligosaccharides including fructans and galacto-oligosaccharides (GOS). For treatment of IBS we recommended that low FODMAP grain foods are substituted for the usual grain food products. For example, products made from rice-, maize-, potato- or corn-flour tend to be low in FODMAPs and are better tolerated than rye and wheat products.

3. Is a low FODMAP diet a long-term solution to IBS?

The low FODMAP diet is not a diet for the long-term; it is designed to alleviate symptoms associated with IBS. We recommend that it is followed for six to eight weeks and then reviewed with a specialist dietitian at which point food containing FODMAPs can be slowly be re-introduced. It is not advisable to stay on a low FODMAP diet for the longer term because the potential 'prebiotic' effect of certain FODMAPs means they are probably essential for maintaining a healthy population of gut bacteria as well as maintaining normal bowel function through important laxative effects.

Wheat Avoidance

Results from the 2011 Consumption Study indicate that 16% of Australians may be avoiding wheat-based foods. This choice appears to be more common in women than men with more than one in every five women reporting limiting wheat (22% women and 12% men).



"The low FODMAP diet is not a diet for the long-term; it is designed to alleviate symptoms associated with IBS. We recommend that it is followed for six to eight weeks... at which point food containing FODMAPs can be slowly be re-introduced."

"An estimated 26% of Australians are currently limiting grain foods in their diet to help lose weight."¹



"Whole grains are an important part of a healthy higher protein diet for weight management which is why the CSIRO Wellbeing diet recommends at least 3 serves of whole grains per day."

Professor Manny Noakes,
Research Program Leader CSIRO
Food, Nutrition and Health Science



Grain Foods & Weight Management

In Australia an estimated 35% of women and 15% of men are currently limiting grain foods such as bread and pasta in their diet to help lose weight.¹ However, the evidence from both cohort studies and clinical trials indicates that whole grains and/or high fibre grain foods can be included in an effective weight loss diet and can aid long-term weight management.

Weight Loss

The popularity of high protein low carbohydrate diets has led some people to cut out all grain foods to lose weight. However, research shows that effective higher protein diets for weight loss and weight maintenance recommend moderate carbohydrate intakes and approximately 4 serves of grain foods each day, with preference to whole grain, high fibre and/or low GI grain foods as part of a nutritionally balanced weight loss diet.^{10,11}

Janet Franklin, APD at Metabolism and Obesity Services at Royal Prince Alfred Hospital, explains that core grain foods are an important part of a weight loss diet: "Many people come to our clinic reporting that they are avoiding high carbohydrate foods mostly bread, rice, and pasta but aren't necessarily avoiding biscuits and cakes. Core grain foods such as whole grain bread, breakfast cereals and rice provide many health benefits that people tend to forget. Rather than focussing on limiting grain foods, it is more important to encourage people to make good carbohydrate choices as part of a calorie-controlled diet by choosing core whole grain or high fibre grain foods first and eating discretionary grain foods which are lower in fibre, higher in salt and fat only occasionally."

Evidence from intervention trials indicates weight loss is achievable with energy controlled diets that are high in grain foods.¹²⁻¹⁴ In saying this a recent meta-analysis comparing weight loss diets found that a moderate carbohydrate higher protein diet may be more effective in the short-term compared to a high carbohydrate low fat diet.¹⁰ However, when these different approaches have been compared over the long term, weight loss results appear to be similar. A recent study that compared the effect of weight-loss diets varying only in the proportions of fat, protein and carbohydrate showed each diet to be equally successful in facilitating and maintaining loss of fat mass, lean mass, visceral adipose tissue, and hepatic fat over six months and after a two year follow up period.¹⁵

Janet Franklin explains, "We find that including grain foods in the diet is more sustainable in the long-term because it allows people to choose from a wide variety of foods and enjoy eating in social situations." *(continued over page)*

Grain Foods & Weight Management (continued)

Long-term Weight Management

Long-term observational studies demonstrate that people who include whole grain and/or high fibre grain foods are less likely to gain weight over time.

Two reviews of the evidence on grain foods and weight have been published in the last five years and conclude that higher intakes of grain foods, particularly whole grains and/or high fibre grain foods, are associated with lower BMI, smaller waist circumference and less weight gain.^{12,16}

A key study of three large cohorts published in the New England Journal of Medicine reported that consumption of whole grains and/or high fibre grain foods is associated with reduced weight gain over four years.¹⁷

In each four year period, participants gained an average of 1.51kg, equivalent to 7.5kg over 20 years. Every additional serve of whole grain food in the diet was associated with significantly less weight gain over four years in both women and men (-0.8 kg). A higher intake of whole grains was associated with less weight gain than higher intakes of vegetables or low fat dairy.

In summary restricting grain foods, particularly whole grain or high fibre grain foods within a low carbohydrate diet does not appear to offer long term advantages for maintaining a healthy weight.^{12,15,17} In fact, rather than promoting health and a healthy weight a recent review found that long term exposure to a low carbohydrate diet increased risk of mortality.¹⁸



"A key study of three large cohorts recently published in the New England Journal of Medicine reported that consumption of whole grains and/or high fibre grain foods is associated with reduced weight gain over four years."



Practice tip:

Rather than restrict core grain foods for weight management, focus on reducing the 'discretionary' grain foods. Some suggestions to 'swap it':

Discretionary grain food		Core Grain Food Alternative	
Banana bread (128g slice)	1700 kJ	Whole grain English muffin toasted with margarine	650kJ
Cafe muffin	1400 kJ	Raisin toast with margarine (2 slices)	800 kJ
Packet of corn chips (large)	1000 kJ	2 cups popped corn (Lite butter flavour)	350 kJ
Cafe Anzac biscuit	1100 kJ	Two whole grain crispbreads with a tablespoon of cream cheese	340 kJ

Reference: Nuttab 2010 and Foodworks 2009



"Consumption of 3-5 serves per day of cereal foods (mainly whole grain) is associated with a reduced risk of weight gain."

Evidence Statement, Australian Dietary Guidelines 2013²

Grain foods & Heart Health

While the protective role of oats and barley in heart health is well established, the role of Australia's staple grain, wheat, is less well known.

A review commissioned by the Grains & Legumes Nutrition Council™ concluded that there is moderate, consistent evidence from cohort studies that higher intakes of whole grain foods including wheat-based foods as well as bran foods, are linked to reduced risk of cardiovascular disease (CVD).¹⁹ The protective effect of grain foods was also highlighted in the scientific evidence review conducted to inform the revision to the Australian Dietary Guidelines which concluded that the 'Consumption of cereal foods (especially whole grains and those with fibre from oats and barley) is associated with a reduced risk of cardiovascular risk in adults'.²⁰ This statement is based on consistent evidence from observational and intervention studies of a 30% reduction in CVD risk with higher intakes of grain foods.

Evidence is beginning to suggest that different grain foods may have different benefits to heart health. Evidence from intervention trials supports the positive effect of the soluble fibre in oats and barley on reducing total and LDL-cholesterol.^{21,22} However, intervention studies from the last 10 years also indicate the protective effect of whole grain foods through impacts on blood pressure, inflammatory status, endothelial function and prebiotic affects. In particular, some emerging evidence suggests whole grain wheat might play a role by helping to control blood pressure.

Did you know?

Men who eat breakfast cereal everyday are less likely to develop hypertension than those who never eat cereal.²³

Handy tips for adding variety to the grain foods in your day:

- Swap oats for a whole grain wheat or bran cereal on some days
- Add barley to soups and stews
- Swap sandwiches for cold pasta salad a couple of times per week
- Snack on a whole grain crackers with hummus or crispbread & avocado
- Have your stir-fry with brown rice

Practice tip:

Grain foods are an important part of a diet for maintaining heart health. It is important to help people understand the benefits of eating a variety of grain foods including whole grain wheat and rye as well as oats and barley.



Refined Grain foods in a Healthy Diet

The current Australian dietary guidelines recommend “Enjoy a wide variety of Grain (cereal) foods, mostly whole grain and/or high cereal fibre varieties, such as bread, cereals, rice, pasta, noodles, polenta, couscous, oats, quinoa and barley”. However, for many Australians refined grain foods such as white bread, white rice and patsa are more familiar and the preferred choice. A systematic review of the evidence from the last 10 years helps answer the question: *What proportion of refined grain foods can be consumed in a healthy diet?*

The review of 135 studies found limited association between refined grain food intake and adverse health outcomes, and no association with cardiovascular disease.²⁴ Similarly, a meta-analysis of prospective cohort studies in 2008 also reported that refined grain food intake is not associated with increased risk of CVD.²⁵

A total of 32 prospective cohort studies were identified, 27 of which found either a protective effect or no association between higher refined grain intakes and CVD, type 2 diabetes, metabolic syndrome or weight gain. Of the nine intervention studies, which largely studied the effect of whole grain or low GI grain foods on cardiovascular or metabolic risk, six reported no significant difference in health outcomes between refined grain food and whole grain food intakes. In summary, the evidence from the review indicates that consuming up to 50% of all grain foods as refined grain core foods is not linked with any increased disease risk.

Eating more whole grain foods and high fibre grain foods remain important health recommendations, so consumers should be encouraged to increase their intake of these foods, ideally enjoying grain foods 3-4 times each day, choosing at least half as whole grain or high fibre grain foods.

Some refined grain foods have a naturally low GI – e.g. traditional sourdough white bread, basmati rice, pasta – and as such these are preferred refined grain food options.

Refined grain foods in the studies mentioned above were defined as those without high levels of saturated fat, salt or added sugar. It is important to advise that discretionary grain foods which are high in saturated fat, salt and added sugar such as cakes, muffins, pastries or pizzas be limited.



“...consuming up to 50% of all grain foods as refined grain core foods is not linked to any increased disease risk.”

Practice tip:

‘One Meal a Day is OK’ as part of a healthy diet that includes whole grain or high fibre grain foods most of the time. This means one meal each day could contain a refined grain food. For example, a whole grain cereal for breakfast, a white bread sandwich at lunch and brown rice with stir-fry for dinner.





Whole Grain Daily Target Intake

In 2006, the Grains & Legumes Nutrition Council™ in collaboration with the International Life Sciences Institute (ILSI) convened an expert panel to determine an Australian Daily Target Intake (DTI) for whole grain intake. This is an achievable, evidence-based target intake of whole grain per day.²⁶

Adults and children over 9 years	48g whole grain each day
Children 4-8 years	32-40g whole grain each day
Children 2-3 years	24g whole grain each day

Whole grain content of core grain foods ²⁷		
Whole grain food	Serve size	Whole grain content (approx.)
Wholemeal bread	1 slice	15-20g
Multi-grain bread	1 slice	2.5-15g
Wheat-flake breakfast biscuit	2 biscuits	30g
Whole grain breakfast cereal	30g (¾ cup)	15-30g
Natural muesli	¼ cup	15-20g
Porridge	½ cup raw oats	30g
Brown rice, barley, bulgur, rye, buckwheat, quinoa	½ cup cooked	62g
Popcorn (plain)	20g	15g

Enjoy a variety of whole grain foods to reach the 48 gram Daily Target Intake.







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